

Intra-operative radiotherapy in conservative treatment of primary soft tissue sarcomas

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Introduction. Conservative surgery (CS) and postoperative radiotherapy (EBRT) is a well-established treatment for primary soft tissue sarcomas (pSTS). Radiation dose effect has been described as improved factor in control disease. Intraoperative radiotherapy allowed deliver high radiation dose selectively.

Purpose. To evaluate the patterns of failure and toxicity of CS and Intraoperative Electron Beam Radiotherapy (IOERT) or Perioperative High Dose-Rate Brachytherapy (PHDRB) in pSTS of the extremities and trunk.

Methods and materials. Patients were treated with CS combined IOERT or PHDRB plus EBRT. Adjuvant chemotherapy was given in high-grade tumours.

Results. 103 patients were retrospectively analysed. Patients received either IOERT ($n = 35$, 34%) or PHDRB ($n = 68$, 66%) plus EBRT. The median size was 7.5 cm. Location were in extremities 80 (77.7%) and trunk 23 (22.3%). AJCC stage I–IIA were documented in 33 (32%) and IIB–III in 69 (67%). Margins was free or close in 80 (77.7%) and affected in 23 (22.3%). Mayor complications acute or late (Toxicity Grade 3–5) was documented in 30 patients (29.1%) 15 out of 35 (42%) in IOERT and 15 out of 68 (22%) in HDRBT patients. After a median follow-up of 75.7 months the 5-year rates of DFS, LRC, DC and OS were 62%, 80%, 73% and 90%, respectively. Univariate analysis of LRC, DFS, DC and OS showed for free margins compared with affected an significance improved 5-year control rates (88% vs. 49%), (70% vs. 27%), (79% vs. 52%) and (84% vs. 64%) respectively. Univariate analysis of DC and OS showed for tumour lower than 9.5 cm compared with higher an improved 5-year control rates (80% vs. 55%, $p = 0.02$) and (95% vs. 80%, $p = 0.04$) respectively. No differences in 5-year LRC rates between IOERT and PHDRB were observed.

Conclusions. Margins and tumour size are the most important prognostic factor in pSTS treated with CS and intra-operative radiotherapy plus EBRT.

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Intraoperative radiotherapy for extremity soft-tissue sarcomas with positive or close margins

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Purpose. Positive surgical margins result in increased local failure. We analyze the efficacy of intraoperative radiation therapy (IORT) for patients (p) with extremity sarcoma with positive or close margins pooled from institutional programs in 2 expert University Hospitals.

Methods. We identified 143p with primary or recurrent (10%) extremity sarcomas that were treated with surgery and IORT. 126p (88%) underwent external beam radiotherapy (EBRT) and 28p (20%) chemotherapy (CT). Median age was 50 years (range 4–84). 8p had distant metastases at the time of IORT. Margin status was microscopically positive (R1) in 25p (18%) and macroscopically positive (R2) in 2p (1%). Median IORT dose was 12.5 Gy (range 7.5–20 Gy) and EBRT dose 50 Gy (25–50.4 Gy). Total dose administered with respect to resection status was equivalent.

Results. After a median follow-up of 3.6 years (range 2–214) the 2-year actuarial Overall Survival (OS), Disease-Free Survival and Local control (LC) for all patients were 85%, 73% and 88% respectively. Microscopic resection margin sarcoma involvement was found to be a significant predictor of local failure with a 2-year LC rate 93% for R0 versus 67% for R1 ($P = 0.03$). Patients with close margins (<1–2 cm) had similar LC to R0 with wide margins (2-years LC 95%). The median interval between surgery and local recurrence was 16.8 months (3–112) for R0 versus 16.5 months (7–74) for R1. Type of first recurrence for R0 was 23% local, 69% distant and 8% mixed, while for R1 was 50% local, 43% distant and 7% mixed. Long-term limb sparing outcome was reached in 95.3% for R0 versus 65% for R1 pathological specimen status. Biological Effective Dose estimations or Chemotherapy were not associated with improved outcome with respect to status resection (potential sample size effect; only 2p R1 received systemic treatment).

Conclusions. Combined modality therapy with external an intraoperative radiation therapy allow limb-sparing in a high percentage of patients with adverse local features. In the present analysis close margins (<1–2 cm) did not have a negative impact on local failure when IORT was applied.

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